

What we claim is:

1. A method of routing a communication transmission from a remote location to a central location comprising the steps of:

- 5 a) providing a first plurality of adjacent communication nodes on a first network level, the nodes forming a first group and having at least one first inter-level communication node;
- b) providing a second plurality of adjacent communication nodes on a second network level, the nodes forming a second group and having at least second and third inter-level communication nodes;
- c) routing the communication transmission through adjacent communication nodes in the first group on the first network level until the transmission reaches the first inter-level communication node;
- d) transmitting the communication transmission via the first inter-level communication node to the second inter-level communication node;
- e) routing the communication transmission through adjacent communication nodes in the second group on the second network level until the transmission reaches the third inter-level communication node; and
- f) routing the communication transmission via the third inter-level communication node to the central location via a fiber backbone.

20 2. The method of Claim 1 wherein the second network level is adapted to aggregate bandwidth from the first network level.

3. The method of Claim 1 wherein the communication transmission is routed between adjacent communication nodes and between network levels via wireless transmission means.

5 4. The method of Claim 1 wherein the wireless transmission means comprises microwave connections based on licensed bands to avoid frequency interference.

5 5. The method of Claim 1 wherein the network infrastructure is based upon ATM technology.

6. The method of Claim 1 wherein each network level comprises a plurality of groups.

7. The method of Claim 1 wherein each group forms a self-healing network ring.

8. A communications network comprising:

a) a plurality of adjacent communication nodes interconnected by first communication links to form a plurality of adjacent ring-like groups;

b) second communication links connecting at least one communication node from each group to at least one communication node in the adjacent group;

c) at least two input/output means located within each node;

20 d) a network decision making means located within each node, the decision making means in communication with the input/output means; and

wherein the plurality of groups are divided into hierarchical network levels, each level comprising at least two groups and wherein each higher network level group has two inter-level communication nodes in direct communication to two independent inter-

level communication nodes on lower level groups.

9. The communications network of Claim 8 further comprising three input/output means located at each inter-level communication node.

10. The communications network of Claim 8 wherein each node is in wireless communication with an adjacent node.

11. The communications network of Claim 10 wherein the wireless communications are microwave connections based on licensed bands to avoid frequency interference.

12. The communications network of Claim 8 wherein the input/output means is a transceiver.

13. The communications network of Claim 8 wherein the network decision making means is an ATM switch configured for maximum redundancy.

14. The communications network of Claim 8 wherein each node has at least two paths into the network.

15. The communications network of Claim 8 wherein each network component has a transmission latency time of approximately 3.0 msec.

16. A method of designing a network comprising the steps of:

- a) providing a plurality of communication nodes;
- b) dividing the plurality of communication nodes into a plurality of groups;
- c) connecting the nodes within each group via a first transmission means;
- d) dividing the plurality of groups into a plurality of hierarchical network levels;
- e) interconnecting the plurality of groups on each network level via a second transmission means;
- f) interconnecting each of the plurality of groups on a higher network level

with a specific group on a lower level via a third transmission means;

g) interconnecting each of the groups on the lower level with a central location; and

wherein each higher network level group has two inter-level communication

5 nodes in direct communication with two independent inter-level communication nodes on lower level groups.

17. The method of Claim 16 wherein each hierarchical level is adapted to aggregate bandwidth from the previous level.

18. The method of Claim 16 wherein the first transmission means is an intra-group communications links.

19. The method of Claim 16 wherein the second transmission means is an intra-level communications link.

20. The method of Claim 16 wherein the third transmission means is an inter-level communications link.

21. The method of Claim 16 wherein the network infrastructure is based on ATM technology.

22. The method of Claim 16 wherein each group forms a self-healing network ring.

23. The method of Claim 16 wherein each of the communication nodes within a group is in contact with at least one adjacent node.

24. A method of restoring a self-healing network comprising the steps of:

a) providing a first plurality of adjacent communication nodes on a first network level, the nodes forming a first group and having at least one first inter-level communication node;

5

- b) providing a second plurality of adjacent communication nodes on a second network level, the nodes forming a second group and having second and a third inter-level communication nodes;
- c) routing a communication transmission to adjacent communication nodes on the first network level along the best path available;
- d) detecting a node failure;
- e) identifying the component or communication link involved in the node failure;
- f) communicating between adjacent nodes to find the best available path available;
- g) selecting the alternative route for the communication transmission;
- h) re-routing the communication transmission until the transmission reaches the first inter-level communication node;
- i) transmitting the communication transmission via the first inter-level communication node to the second inter-level communication node;
- j) routing the communication transmission around adjacent nodes on the second network level until the transmission reaches the third inter-level communication node; and
- k) routing the communication transmission via the third inter-level communication node to the central location via a fiber backbone.